

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY



(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 10 MAY 2006

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Applicant's or agent's file reference B16.WO.1.09	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/IB2005/000320	International filing date (day/month/year) 09.02.2005	Priority date (day/month/year) 12.02.2004	
International Patent Classification (IPC) or national classification and IPC INV. B01D46/24			
Applicant BMC S.R.L. et al.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p style="margin-left: 20px;">a. <input checked="" type="checkbox"/> <i>sent to the applicant and to the International Bureau</i> a total of 4 sheets, as follows:</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p style="margin-left: 20px;">b. <input type="checkbox"/> <i>(sent to the International Bureau only)</i> a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input checked="" type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 12.12.2005		Date of completion of this report 09.05.2006	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized officer Sembritzki, T Telephone No. +49 89 2399-8626 <div style="text-align: right;">  </div>	

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/B2005/000320

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

2-5	as originally filed
1	received on 14.12.2005 with letter of 12.12.2005

Claims, Numbers

7(part), 8-18	received on 14.12.2005 with letter of 12.12.2005
1-6, 7(part)	received on 28.03.2006 with letter of 24.03.2006

Drawings, Sheets

1/2, 2/2	as originally filed
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- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/IB2005/000320

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-18
	No: Claims	
Inventive step (IS)	Yes: Claims	1-18
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-18
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

and /or

2. Non-written disclosures (Rule 70.9)

see separate sheet

Reference is made to the following documents:

- D1: EP-A-1 413 347 (PALLADINI, WALTER; PALLADINI, ALBERTO; GIANOTTI, VANNA) 28 April 2004 (2004-04-28)
D2: US-A-4 695 299 (SPADARO ET AL) 22 September 1987 (1987-09-22)
D3: US-B1-6 638 330 (BERGAMI GAETANO) 28 October 2003 (2003-10-28)
D4: US-A-5 238 474 (KAHLBAUGH ET AL) 24 August 1993 (1993-08-24)

Item V:

1. Novelty and inventive step

- 1.1 Document D2 discloses a cyclone having at its upper outlet side a filter. The filter comprises a tubular housing having an inlet at its lower end and an outlet at its opposite upper end. A cylindrical filter element is installed in connection with the inlet opening and a tubular body forming the outlet opening protrudes towards inside said tubular casing (see D2, figure 1). The subject-matter of claim 1 differs from D2 in that the tubular body is trumpet shaped and in that the inside of the filter element is provided with deflecting means. Consequently, the subject-matter of claim 1 is novel (Article 33(2) PCT).
- 1.2 The problem underlying the present application is to prevent larger objects, which might have been forgotten in the housing from being sucked into the engine of a vehicle. Due to the air flow caused by the trumpet shaped tubular body, light objects are captured and collected in the recess between the trumpet and the inner wall of the housing. Such a solution is neither disclosed in nor suggested by the available documents. Accordingly, the subject-matter of claim 1 is regarded as involving an inventive step (Article 33(3) PCT).
- 1.3 Claims 2-18 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

2. Industrial application

The industrial applicability is obvious.

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/IB2005/000320

Item VI:

Certain documents

Document D1 is an intermediate document which is not relevant, since it does not disclose deflecting means within the filter element.

LOW RESISTANCE AIR FILTER DEVICE

TECHNICAL FIELD

5 The present invention relates to the technical field concerning filter devices of the air destined to the air-fuel mixture sucked by the combustion engines and refers to a low resistance air filter device.

The known filter devices comprise an air filter, having a form flattened, cylindrical or
10 conic, contained in a respective case having an opening in flow communication with the air intakes and a further opening connected to the engine.

BACKGROUND ART

There are known cases whose opening connected to the engine, and therefore
15 downstream of the filter in comparison to the air flow, it introduces strong resistances and turbulences that cause the drawback to reduce the air flow to the engine.

There are known cases for filters provided with an inner link between the inlet opening
and the side wall fit to reduce the air resistance.

A drawback of such filtering devices consists in that the link allows the passage of
20 possible extraneous object, for instance nuts or screw forgotten or fallen in the case of the filter, in the inlet collectors of the engine with serious damage risks of this latter. The risk of extraneous object presence is particularly relevant in the race filter devices that are continuously opened for inspections, cleaning, substitution also during hurried phases of job on different organs of the engine in the same time.

25 Further drawbacks of the said known filters consist in the fact that they increases the weight and they reduces the inside volume for the air.

Document US-A-4 695 299 discloses a cyclone having at its upper outlet side a filter.
The filter comprises a tubular housing having an inlet at its lower end and an outlet at its
opposite upper end. A cylindrical filter element is installed in connection with the inlet
30 opening and a tubular body forming the outlet opening protrudes towards inside said tubular casing.

DISCLOSURE OF THE INVENTION

28. 03. 2006

CLAIMS

(87)

- 1) Low resistance air filter device comprising a tubular case (2) for at least a tubular shaped filtering element (3) fixed to a lower opening (9) of the case (2) said device
5 being provided, at its opposite upper opening (10), of outlet means (8) provided with an outflow opening (7) for the air, said device (1) being characterized in that the outlet means (8), at the outflow opening (7) are provided with a trumpet shaped tubular body (11) protruding toward inside of said tubular case (2) and connecting, in flow communication, the inner volume of the tubular case with the outflow
10 opening (7) the same; the inside of the free end of the filtering element (3) being provided with deflecting means (6) provided to forcibly deflect of the air flow towards the filter.
- 2) Device according to claim 1 characterized in that the outlet means (8) are formed as
15 a shaped flange integral with the tubular body (11).
- 3) Device according to claim 1 characterized in that the trumpet of the tubular body (11) enlarges toward inside of the device (1).
20
- 4) Device according to claim 1 characterized in that the trumpet of the tubular body (11) is narrowed toward inside the device (1).
- 5) Device according to claim 1 characterized in that it comprises support means (4)
25 fixed at the lower opening (9) of the case (2) and fit to bind at one inlet opening (5) for the air of the support means (4) the same, said filtering element (3).
- 6) Device according to claim 1 characterized in that says outlet means (8) are peripherally provided of a recess (14) for housing the inside wall of said tubular
30 case (2) at its upper opening (10).
- 7) Device according to claim 1 characterized in that says outlet means (8) are

are peripherally provided of a recess (14) for housing the inside wall of said tubular case (2) at its upper opening (10).

5 ~~9)7)~~ Device according to claim 1 characterized in that says outlet means (8) are detachably fixed to said tubular case (2) by means of fixing means (15).

10 ~~10)8)~~ Device according to claim ~~7-1~~ characterized in that says deflecting means (6) are substantially shaped as a cone whose vertex is directed toward the inlet opening (5) and whose base is integral fixed to the free edge of the filtering element 2.

15 ~~11)9)~~ Device according to claim ~~10-8~~ substantially characterized in that said almost conic shape of said deflecting means (6) has an axial section shaped as two half-parabolas with parallel axes and joined branches at the vertex of the deflecting means (6) making a concave (6a) or convex (6b) profile.

~~12)10)~~ Device according to claim 1 characterized in that says tubular case (2) has an elliptic or oval section.

20 ~~13)11)~~ Device according to claim 1 characterized in that says tubular case (2) is made of carbon fiber.

25 ~~14)12)~~ Device according to claim 1 characterized in that says filtering element (3) it is in cotton soaked with low viscosity oil.

~~15)13)~~ Device according to claim 1 characterized in that said support means (4) are peripherally provided of a seat (13) for housing the inside wall of said tubular case (2) at its lower opening (9).

30 ~~16)14)~~ Device according to claim 1 characterized in that said tubular case (2) is detachably stopped to said support means (4) through fixing means (14).

~~17~~15) _____ Device according to claim 1 characterized in that said support means (4) |
are made out of nylon strengthened with glass fiber.

5 ~~18~~16) _____ Device according to claim 1 characterized in that said filtering element |
(3) is cylindrical.

~~19~~17) _____ Device according to claim 1 characterized in that it includes spacer |
means (20) positioned between the tubular body (11) and the filtering element (3).

10 ~~20~~18) _____ Device according to claim ~~19-17~~ characterized in that the spacer means |
(20) matches the inside wall of the tubular case (2).